DaimlerChrysler AG

Hybrid component and associated production method

The present invention relates to a hybrid component having the features of the preamble of claim 1 and to an associated production method.

A hybrid component of this type is known, for example, from DE 100 29 411 A1 and consists of a metal body and of a plastic body injected-molded on the latter. In the known hybrid component, the plastic body serves for the connection of two metal bodies, the plastic body being injection-molded such that it forms an electrically insulating layer between the two metal bodies. The metal bodies are in this case, on the one hand, an extruded profile and, on the other hand, a sandwich element.

In order to protect the metallic surfaces of a hybrid component from environmental influences, in particular from corrosion, it is possible, in principle, to provide the respective metal body with a suitable surface coating. This, however, may be relatively complicated.

For metal bodies which are produced from a coil-coated metal sheet, there is, according to DE 37 04 364 C1, the possibility of coating cut edges occurring during edging and stamping operations with the aid of a lacquer curing as a result of UV radiation, in order thereby to seal them.

It is known from DE 40 11 320 C2 to seal cut edges of stamped, pressed or cut plate-shaped metal parts by coating with a coating powder by means of an electrostatic powder spraying method.

The known methods for sealing cut edges of this type are comparatively complicated.

The present invention is concerned with the problem of indicating, for a hybrid component of the type initially mentioned, a way which makes it possible to produce cost-effectively a hybrid component provided with surface protection.

This problem is solved, according to the invention, by means of the subjects of the independent claims. Advantageous embodiments are the subject matter of the dependent claims.

The invention is based on the general idea of using a surface-coated sheet metal body for producing the hybrid component and of modifying the injection molding of the plastic body in a controlled way such that, as a result, cut edges occurring during the production of the sheet metal body from a plate-shaped metal sheet are injection-molded around with plastic. By virtue of this measure, the sealing of the cut edges is integrated into the injection molding of the plastic body. In order to increase the stability of the sheet metal body, in this case, the plastic body is at the same time designed as a stiffening, with the result that it acquires a double function. Overall, the hybrid component can thus have the desired rigidity which arises due to the stiffening of the sheet metal body with the aid of the plastic body. By the injection molding operation being refined in the way proposed according to the invention, the hybrid component can be produced cost-effectively such that its metal surfaces are protected from harmful environmental conditions.

In an advantageous development, the plastic body may consist, in the region of the uncoated edges of the sheet metal body, of a plastic other than that in the

remaining body. By virtue of this type of construction, the plastics can be optimized in terms of their functions. Expediently, the plastic injection-molded onto the edges is selected in light of the surface protection of the sheet metal body, while the plastic in the remaining plastic body is selected in light of the desired stiffening effect.

Further important features and advantages of the invention may be gathered from the subclaims, from the drawings and from the accompanying figure description with reference to the drawings.

It goes without saying that the features mentioned above and those yet to be explained below may be used not only in the combination specified in each case, but also in other combinations or alone, without departing from the scope of the present invention.

Preferred exemplary embodiments of the invention are illustrated in the drawings and are explained in more detail in the following description, the same reference symbols relating to identical or functionally identical or similar components.

In the drawings, in each case diagrammatically,

figs 1 to 4 show in each case a greatly simplified basic illustration in a longitudinal section through a hybrid component according to the invention in various phases of its production,

figs 5 and 6 show in each case a view, as in fig. 4, but in each case in other embodiments.

According to fig. 4, a hybrid component 1 according to the invention comprises a metallic sheet metal body 2

and a plastic body 3 which, as here, may perfectly well also be multipart. The sheet metal body 2 is provided with a surface coating 4 on one visible side, here on both visible sides, and, by virtue of its production and/or processing, has edges 5 which arise during the edging of the sheet metal body 2 on its outsides and/or during the punching out of, in particular, a perforation 6 and/or as a result of another processing method and which are correspondingly uncoated.

According to the invention, then, the plastic body 3 is injected-molded onto the sheet metal body 2 such that the uncoated edges 5 are thereby sealed. That is to say, the free edges 5 are framed by the plastic 7 of the plastic body 3.

Whereas, in the embodiment according to fig. 4, the plastic body 3 is produced in a unitary manner from one and the same plastic 7, fig. 5 shows a variant in which the plastic body 2 is designed as a two-component part, specifically such that, in a controlled way, it consists, in the region of the edges 5, of a plastic 7' other than that in the remaining plastic body 3. As a result, within the plastic body 3, the plastic 7 or 7' can be optimized in light of its function. For example, the plastic 7' assigned to the edges 5 is suitable especially for the surface protection of the sheet metal body 2, while the plastic 7 used in the remaining plastic body 3 is selected in light of the main function of the plastic body 3. In the hybrid component 1 according to the invention, this main function is the stiffening of the sheet metal body 2. This means that the hybrid component 1 acquires its desired rigidity and strength solely due to the bond between sheet metal body 2 and plastic body 3.

In the special embodiment shown in fig. 5, moreover, the plastic body 3 is configured such that it

completely covers one of the visible sides of the sheet metal body 2. The hybrid component 1 may be used, for example, in motor vehicle construction. For example, the hybrid component 1 may be a trim element which is foam-backed and stiffened with the aid of the plastic body 3.

The embodiment according to fig. 6 corresponds essentially to the variant from fig. 4, but shows that the plastic body 3 does not have to fill the perforation 6 completely. The injection-molded plastic 7 here surrounds or seals the orifice margin only, that is to say the edge 5 of the perforation 6, so that, even after the injection molding of the plastic body 3, an orifice passing through the hybrid component 1 remains.

A method according to the invention for the production of the hybrid component 1 according to the variant shown in fig. 4 is explained in more detail below.

First, according to fig. 1, the sheet metal body 2 is produced from a plate-shaped metal sheet which is provided at least on one visible side with the surface coating 4, in particular from a coil-coated metal sheet. In this case, the shape desired in each case for the sheet metal body 2 is produced from the plate-shaped metal sheet by plastic forming and/or by edging or cutting and/or by stamping. This gives rise on the sheet metal body 2 to the uncoated cut or stamped edges 5.

According to fig. 2, the sheet metal body 2 produced in this way is introduced into an injection-molding die 8 which in this case has a lower part 9 and an upper part 10 which come to bear one against the other at a parting line 11. In the injection-molding die 8, to produce the plastic body 3 or its parts, cavities 12

are formed which are connected to injection ducts 13. It is clear that corresponding venting ducts may also be provided.

According to fig. 3, then, according to an arrow 14, the plastic 7 is injected into the cavities 12 through the injection ducts 13, with the result that the plastic body 3 is formed in the cavities 12. The cavities 12 are in this case configured such that the injected plastic 7 can close and thereby seal the edges 5 of the sheet metal body 2.

According to fig. 4, after being removed from the injection-molding die 8, the hybrid component 1 is essentially finished.

In so far as the plastic body 3 is designed as a two-component part, the plastic 7' sealing the edges 5 can be injection-molded first in a first injection-molding die. Subsequently, in a second injection-molding die, the other plastic 7 can be injection-molded in order to form the remaining plastic body 3. A variant is preferred, however, in which the two-component technology can be carried out in one and the same injection-molding die 8.